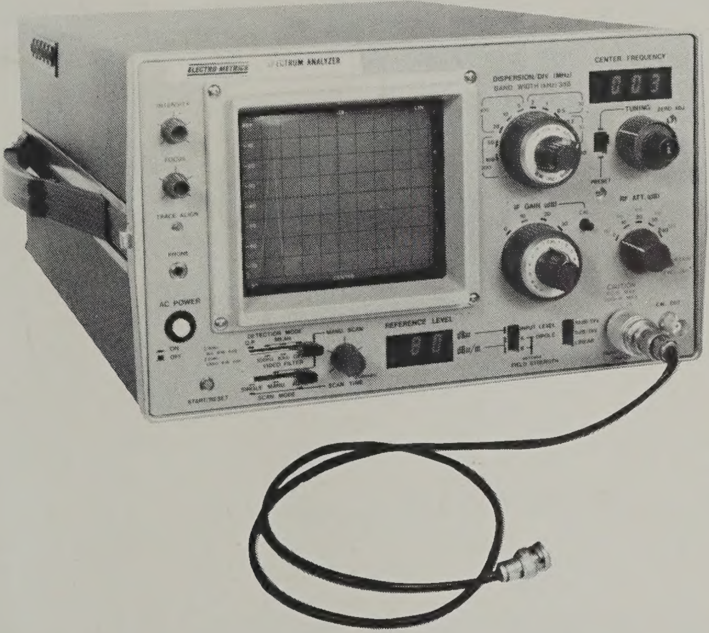
ELECTRO-METRICS

A PENRIL COMPANY

EMI SPECTRUM ANALYZER
MODEL ESA-1000

For EMI Analysis plus Conventional Applications, 100kHz–1000MHz



Applications:

- EMI Analysis for conformance to FCC, VDE, and other mandates.
- EMI Compliance testing for Conducted Limits, 100kHz – 30MHz.
- EMI Compliance testing for Radiated Limits, 30-1000MHz.
- Plus all the usual spectrum analyzer applications, such as measurement of FM deviation, AM modulation, and cross modulation products.

Features:

- Average and CISPR Quasi-Peak Detectors for FCC/CISPR/VDE testing.
- CISPR Bandwidths for FCC and VDE testing.
- Panoramic Reception 100kHz – 1000MHz.
- Measurement of Noise Intensity & Electric Field Strength, 100kHz – 1000MHz.
- Direct Reading of Electric Field Strength using optional antennas, 30 – 1000MHz.
- Full 80dB CRT display range.
- High RF Sensitivity permits analysis of compliance to most EMI limits.
- Three choices of Scan Mode: Single, Manual and Automatic.
- Video filter for viewing detected envelopes with reduced noise.
- LED displays of Reference Level and Center Frequency.
- Drives optional X-Y plotter to produce permanent hard-copy records.
- Optional Rechargeable Battery pack available for field operation.

100 CHURCH ST. • AMSTERDAM, N.Y. 12010 • 518-843-2600 **ELECTRO-METRICS**

THE MODEL ESA-1000 IS A UNIQUE SPECTRUM ANALYZER DESIGNED FOR EMI TESTING

The model ESA-1000 is a unique spectrum analyzer specifically designed to display and measure EMI (Electromagnetic Interference) and is an especially valuable tool for the EMI engineer working to suppress interference from a prototype device or system. When used with appropriate pick-up devices, the Model ESA-1000 can provide accurate quantitative measurements of conducted and radiated EMI over the entire frequency range from 100kHz to 1000MHz. The relatively high sensitivity of the instrument permits it to be used for conformance testing to all pertinent FCC/VDE conducted limits and, with reduced antenna spacings, for analyzing conformance to similar radiated limits.

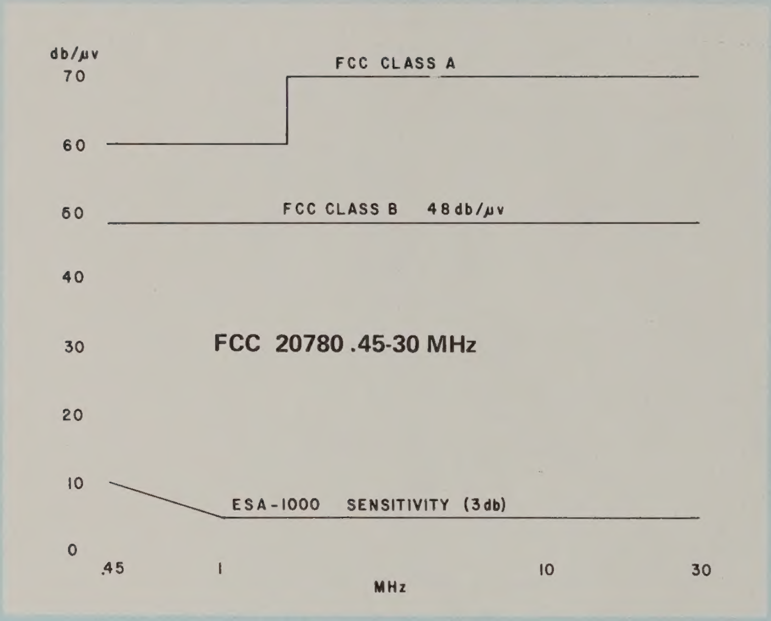


Figure 1 shows that the internal noise of the Model ESA-1000 is sufficiently low to permit measurements of conducted EMI to determine compliance to various FCC and VDE limits.

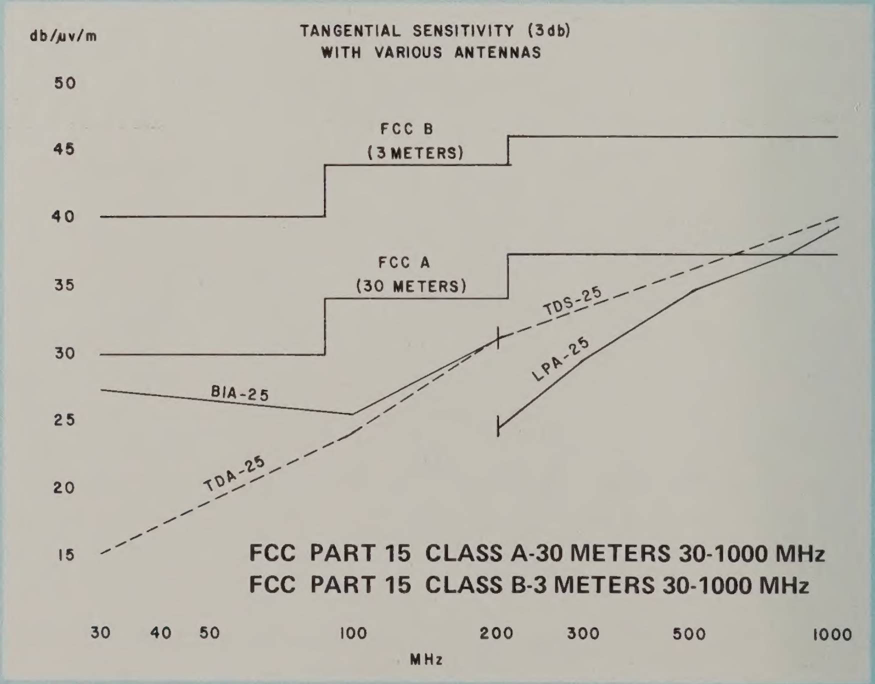


Figure 2 shows the sensitivity of the Model ESA-1000 for radiated measurements, 30-1000MHz using recommended optional antennas and compares this sensitivity to the limits of FCC Docket 20780.

Represented by
AULT ASSOCIATES
1572 Union Avenue
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(415) 367-1710

ELECTRO-METRICS
A PENRIL COMPANY
100 Church St., Amsterdam, New York 12010

SPECTRUM ANALYZER

ESA-1000 OPTIONS & ACCESSORIES

ESA-1000	Spectrum Analyzer (100kHz-1000MHz) Including: Input Cable BNC-BNC, Input Cable Type N-Type N, N-BNC Conversion Adapter, Front Panel Cover	$8,950
DM-1000	Digital Memory	2,400
CAM-1000	Camera, camera mount and attachment	price on request
BAT-1000	Battery Pack Optional, (3.5 hour operation)	2,500

ACCESSORIES

C-1000	RF Coupler (DC to 1000MHz)	450
H-1000	CRT Hood	35
FPH-1000	Front Panel Hood	180
CAB-15	Coaxial Cable, 25ft.	60
CIG-25	Calibrated Impulse Generator	1,350
EFP-25	Electrostatic Probe	200
EHF-25	Earphones, High Intelligibility	50
EXY-125B	11" x 17" X-Y Plotter (single-pen) with manual and interconnecting cable	2,350
HPF-30	High Pass Filter 30MHz	300
ICC-1000	Instrument Carrying Case	295
LPF-30	Low Pass Filter 30MHz	275
LPF-1000	Low Pass Filter 1000MHz	250
MSA-25	Mast section, 20 inches	50
PCL-25	Clamp-on Probe, 10kHz-110MHz	325
TRI-25	Tripod, Rugged	450

ANTENNAS

ALR-25M	Loop Antenna, 10kHz-30MHz Manually Switchable with CAB-15 Coaxial Cable and manual	1,180
BIA-25	Biconical Antenna 20-200MHz with AMT-25 Antenna Mount, Clamp Mount, CAB-15 coax. cable and manual	895
BDA-25	Broadband Dipole Antenna 20-200MHz with CMT-25 Clamp, AMT-25 Antenna Mount, CAB-15 coax. cable and manual	835
LPA-25	Log Periodic Antenna 200-2000MHz with CAC-10 coax. cable and adapter UG-201	1,190
RVR-25M	Manually switchable Vertical 41 in. Antenna 10kHz-30MHz with CAB-15 coax. cable and manual	1,000
TDA-25	Tunable Dipole Antenna 20-200MHz, with CAB-15 coax. cable and manual	1,000
TDS-25	Tunable Dipole Set 200-1000MHz, with CAB-15 coax. cable and manual	800

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(over)

LISN'S

Model/No. of Phases	Frequency Range	Current Capacities	Price per Phase
LISN-FCC-5/	450kHz-30MHz	5 amp.	$285.
LISN-FCC-25/	450kHz-30MHz	25 amp.	350.
LISN-VDE-5/	10kHz-30MHz	5 amp.	550.
LISN-VDE-25/	10kHz-30MHz	25 amp.	600.

Complete model designation by inserting number of phases required after slash. Other current ratings available on request.

ASK ABOUT - SPECS FOR ANSI & FCC

ESA-1000	8950	ANALYZER	
DM 1000	2400	DIGITAL MEM	
HPF-30	300	30MHZ HI PASS FILTER	
LPF-30	275	30MHZ LO PASS FILTER	
LPF-1000	250	1000MHz LO PASS FILTER	
TDA-25	1000	20-200MHz DIPOLE	OR EQUIV
TDS-25	800	200-1000MHz DIPOLE	
2ea LISN-FCC-25	700/2	25A 450KHz - 30MHz LISN	
TRIPOD	450	≅1 MTR HI?	
20" MAST SECTIONS	400 for 4 MTRS WORTH		
	$15,525		

WHAT IS CALIBRATED PULSE GENERATOR?

OPTIONS

1) CAL PULSE GEN? $1,350
2) CAMERA $425 ← maybe can use?
or PLOTTER $2,750
3) ELECTROSTATIC PROBE? $200
4) RF COUPLER $450

WHAT IS RF COUPLER?

CONDUCTIVE
GROUND CLOTH OVER TEST AREA.

EMCO - Cal chart for 1-3 + 10 meters?

Ansi - Proposed calibration of FIELD SITES
C63.4

ROTATING EUT IF IT IS RECT BOX
~~How~~ @ 3 meters where is the 3 meters same as for depth

Analyzer Shortcomings - input overload - what else?
Digital output to computer?

ELECTRO-METRICS
A PENRIL COMPANY
100 CHURCH STREET • AMSTERDAM • NEW YORK 12010 • TEL: 518-843-2600 • TWX: 710-446-4798

Ref: 1-2-SD-27
January 18, 1982

Mr. Bob Frank
Integrand
8620 Roosevelt Avenue
Visalia, California 93291

Dear Mr. Frank:

Thank you for your call and your interest in the products manufactured by Electro-Metrics.

Enclosed is literature and pricing on the ESA-1000 for your perusal.

I look forward to meeting you at the seminar scheduled for February 4 in California.

Sincerely yours,

ELECTRO-METRICS DIVISION

Terry Daggett

Terry Daggett
National Sales Coordinator

Encs.
cc: Ault Associates
1572 Union Ave.
Redwood City, CA 94061

DIRECT READING OF ELECTRIC FIELD STRENGTH IS A SPECIAL FEATURE

A special feature included in the Model ESA-1000 is the capability to read field strength directly, by having the digital indication of reference level include the appropriate offset for antenna factor. In other words, if the antenna factor of the TDA-25 dipole is 8dB at 80MHz, by setting the Reference Level Selector to the Antenna A (Dipole) position and the Center Frequency to 80MHz, a reference level of 100dBuV will automatically be changed to 108dBuV/m.

SPECIAL ACCESSORY DEVICES TO FACILITATE EMI TESTING INCLUDE A DIGITAL MEMORY UNIT

A complete complement of options and accessory devices is listed on page four of this brochure. Perhaps the most unique item in this listing is the DM-1000 Digital Memory Unit. (See page 4.)

Purpose of the DM-1000 is to permit a visual display on the CRT of the Model ESA-1000 Spectrum Analyzer of data being read at the very slow scan rates dictated by time constants of CISPR quasi-peak detection. The DM-1000 Digital Memory stores such data at slow input rates and displays it on to the CRT of the ESA-1000 at a much faster rate (approximately 4ms/sweep). Dual channels within the DM-1000 permit the display of data fixed in Channel A simultaneously with data being actively accumulated into Channel B.

ESA-1000 SPECIFICATIONS

Frequency Specifications

Frequency Range: 100kHz to 1000MHz

Center Frequency Display: Unit of 1MHz, digital display by LED.

Center Frequency Display Accuracy: Within ± 10MHz.

Scan Width: By DISPERSION/DIV switch, 100MHz/Div to 100kHz/Div in 1-2-5 steps and zero scan.

Scan Linearity: Within ±5%

Tuning Mode: By Center Frequency Tuning.

Frequency Stability: Within 200kHz/5 minutes

Residual FM: Within 10kHz p-p

Noise Sidebands: −70dBc, 200kHz away from carrier with IF B.W. 10kHz.

IF Bandwidth: 300kHz, 100kHz, 30kHz, 10kHz (3dB) automatically set by Dispersion/Div. switching or 1.5MHz, 120kHz, 9kHz (6dB) manually set.

IF Bandwidth Accuracy: Within ±20%

IF Bandwidth Selectivity: 60dB/3dB IF Bandwidth ratio < 15:1

IF Bandwidth Switching Accuracy: Within ±1dB.

Amplitude Specifications

Display on CRT: Switchable to 10dB/div., 5dB/div., or LINEAR

LOG Display Accuracy: Within ± 1dB/10dB, ±1.5dB/40dB, ±2dB/80dB

Reference Level Display: 3 digits, 7-segment LED, 1dB resolution.

Reference Level Selection: Input Level (dBuV), Field Strength (dBuV/m) "A" or "B", Field Strength measurement "A" is half-wave dipole, "B" is Log periodic antenna. Respective antenna factor included in Reference Level.

Reference Level Accuracy: Within ±1.5dB.

Dynamic Range on CRT: 80dB

Average Noise Level: Below 5dBuV (at IF Bandwidth 10kHz, Video Filter 100Hz)

Spurious Response: −70dB or less (at RF ATT. 0dB, 80dBuV input)

Residual Response: Less than 20dBuV (at RF ATT. 0dB, 80dBuV input)

Video Filter: 100Hz, 10kHz, OFF switchable in MEAN Detection Mode.

Frequency Response: Within ±1dB, 100kHz to 1000MHz

IF Gain: 0 to 30dB in 10dB steps, −6dB to +6dB in 1dB steps

Gain Compression: Less than 1dB (at RF ATT. 0dB, 100dBv input)

Detection Method: Mean (Average Value) Dynamic Range 80dB and CISPR Quasi-Peak Dynamic Range 40dB.

Input Specifications

Input Connector: Type N.

Input Impedance: 50 ohms.

V.S.W.R.: Below 1.5 at RF ATT. 10dB.

Input Attenuator: 0 to 40dB in 10dB steps

Max. Permissible Input Level: 130dBuV ±50V DC

Scan Specifications

Scan Time: 20ms. to 10s continuously variable

Scan Mode: Single, Manual, Auto.

General Specifications

CRT: 94 x 75mm (scale 10 x 8) P31 phosphor

X Axis Output: Approximately ±5v, Impedance 10K ohms

Y Axis Output: Approximately 0 to 3.5V, Impedance 10K ohms

Audio Monitor Output: 8 ohms (Earphone EHF-25)

Calibration Output: Frequency: 100MHz ±200kHz
Level: 80dBuV ±0.5dB

Operational Temperature: 0°C to +40°C

Power Requirements: 115VAC ±10% 50/60Hz, consumption less than 50VA (at least 3.5 hours with BAT-1000 Battery Pack)

External Dimensions: Approximately 12" (W) x 7" (H) x 15" (D) [300 x 170 x 430mm]

Weight: Approximately 27 pounds.

ALL SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

ESA-1000 OPTIONS AND ACCESSORIES

- DM-1000 Digital Memory Unit
- CAM-1000 Camera, camera mount and attachment
- BAT-1000 Battery Pack (3.5 hour operation)

ACCESSORIES

- C-1000 RF Coupler (DC to 1000MHz)
- H-1000 CRT Hood
- FHP-1000 Front Panel Hood
- CA-70N/BNC Coax. Adapter "N" to "BNC"
- CIG-25 Calibrated Impulse Generator
- EFP-25 Earphones, High Intelligibility
- EXY-125B 11" x 17" X-Y Plotter (Single Pen) with manual and interconnecting cable
- HPF-30 High Pass Filter 30MHz
- ICC-1000 Instrument Carrying Case
- LPF-30 Low Pass Filter 30MHz
- LPF-1000 Low Pass Filter 1000MHz
- MSA-25 Mast Section, 20 inches
- PCL-25 Clamp-on probe, 10kHz to 110MHz
- TRI-25 Tripod, Rugged.

ESA-1000 ANTENNA OPTIONS

BDA-25 Broadband Dipole Antenna with CMT-25 clamp, AMT-25 Antenna Mount and manual. The BDA-25 is designed for measuring field strength intensities and is fixed-tuned in three broad bands by means of easy-to-add dipole arm extensions. Greater surface area results in improved broadband sensitivity.

BIA-25 Biconical Antenna with AMT-25 Antenna Mount, CMT-25 Clamp and manual. The BIA-25 operates over the 20 to 200MHz frequency range. The broadband frequency capability of the BIA-25 eliminates the need for band switching, element extension or external tuning when used for EMI ambient surveys or spectrum signature measurements.

LPA-25 Log Periodic Antenna with coaxial cable and adapter. The LPA-25 which operates over the 200 to 1000MHz frequency range eliminates the need for band switching, element extension or external tuning. Linearly-polarized design permits separate measurement of horizontal and vertical electric field components.

TDA-25 Tuned Dipole Antenna with CAC-25 coaxial cable, CMT-25 clamp and manual. The TDA-25 is designed to operate over the 30 to 200MHz frequency range. The adjustable dipole elements are set by using the frequency conversion scale (FCS-25) which is included. The TDA-25 complements the TDS-25 to provide tuned dipole coverage for the full range of radiated measurements to comply with the latest FCC specifications.

TDS-25 Tuned Dipole Set with CAC-25 coaxial cable, CMT-25 clamp and manual. The TDS-25 is designed to operate over the 200 to 1000MHz range. Results from other linearly-polarized antennas in the verification/certification process must be correlated with the results of a tuned dipole.

All Antennas Furnished With Antenna Factor Charts.

EMC SERIES LINE IMPEDANCE STABILIZATION NETWORK

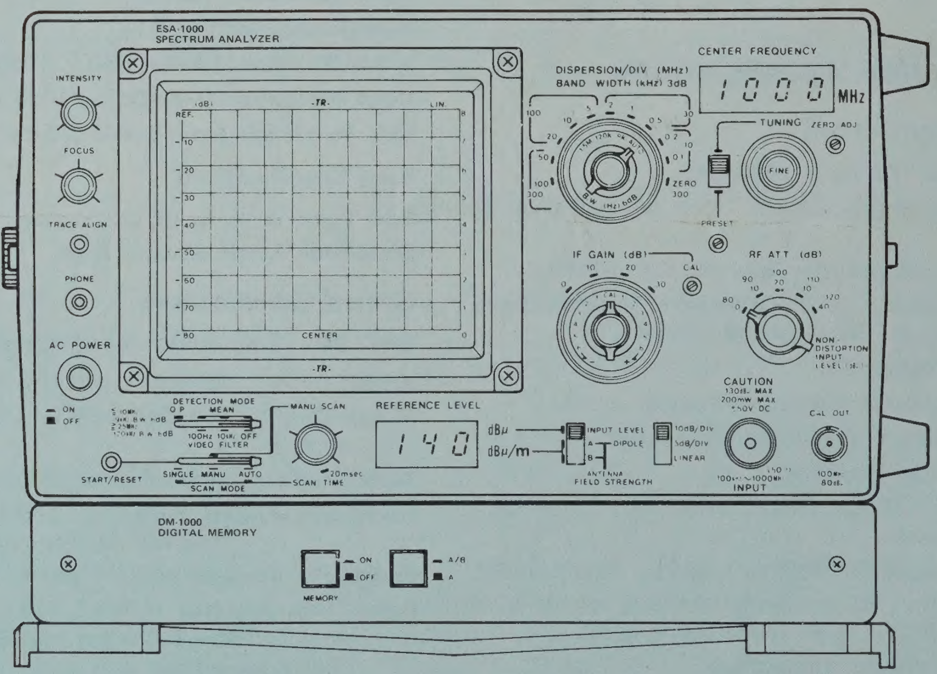
Model LISN/FCC (450kHz – 30MHz)
Specify phases and current requirements.

Model LISN/VDE (10kHz – 30MHz)
Specify phases and current requirements.

When measuring conducted radio interference voltages from line to ground, it is essential to stabilize the line impedance so that repeatable tests can be made at more than one facility.

The EMC Series LISN's are designed to meet FCC, VDE and CISPR standards for conducted emissions measurements. Each LISN is designed to insert a relatively constant impedance to high frequency signals which may be present on the power lines, between the device under test and the power source.

When the associated measuring equipment is a spectrum analyzer or EMI meter which uses an electronically controlled solid state attenuator it is recommended that a high-pass filter be used. This precaution prevents possible damage to the attenuator's FET semiconductors caused by transients.



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